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GINSCHEIM-GUSTAVSBURG WATER TREATMENT PLANT (32,500 PE)

Job Report: Efficiency improvement by intermittent nitrification/denitrification

General Information

The wastewater treatment plant Ginsheim-Gustavsburg treats the sewage of the city of Ginsheim-Gustavsburg as well as of the commune Bischofsheim. The system is constructed for a population equivalent (PE) of 32,500 and is currently charged with a PE of 29,500.



Main Features

Customer:

Zweckverband Abwasser- und Servicebetrieb Mainspitze (ASM)

Capacity:

32,500 PE

Construction time:

November 2009 to May 2013

Initial Situation

The biological treatment of the wastewater treatment plant Ginsheim-Gustavsburg was separated into two parallel connected basins with an effective volume of 1,500 m³ each as a denitrification/Bio-P step. One basin with an effective volume of 1,420 m³ as a nitrification step was connected to each denitrification basin. The third line of parallel basins was not connected.

Each denitrification/Bio-P basin was composed of three cascades (500 m³ each). Optionally the last cascade could be switched into aeration performance. The nitrification basins were permanently aerated with a setpoint for oxygen of

2.0 mg/l. Depending on the ammonium content it was even able to achieve values up to 5.0 mg/l.

Recirculation was achieved with two unregulated circulation pumps per basin. During the operation of the sludge press, the process water was dosed continuously. The precipitant was dosed according to the phosphate concentration.

Aqualogic® Installation

To improve the treatment performance and the energy efficiency of the waste-water treatment plant Ginsheim-Gustavsburg, an optimization plan was developed together with Aqseptence Group GmbH. In November 2009 the aeration system was renewed. All initial diffusers were replaced by tube diffusers Bioflex® IV (Aqseptence Group GmbH) and the aeration system was extended. Planned stirring units were not required as a satisfying biomass distribution during denitrification was achieved by short air blasts of the aeration system.

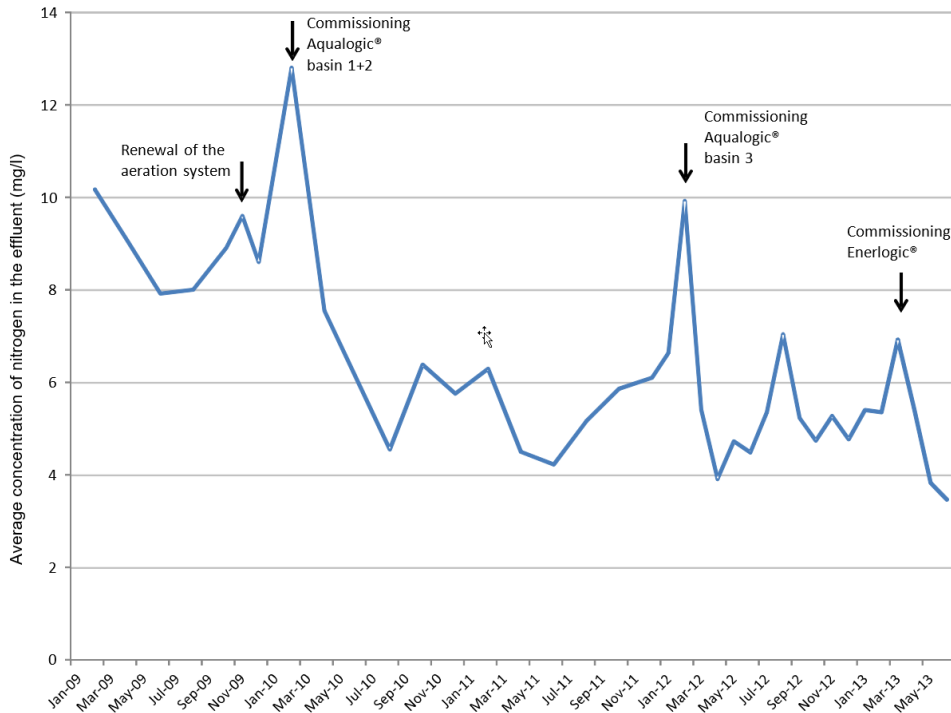
In March 2010 the nitrate and ammonium measurements related Aqualogic® control system of Aqseptence Group GmbH, based on fuzzy logic, was implemented. For this purpose the whole measurement instrumentation was renewed and extended. Additionally, an oxygen loss controller was implemented. The permanent aerated nitrification step was converted into an intermittent operation.

The recirculation, as well as the dosing of precipitant and activated return sludge were controlled as required.

In March 2012 the third line of parallel basins was commissioned and the Aqualogic® control system was extended. In May 2012 the Enerlogic® control modules were implemented to improve energy efficiency.

Results

Due to the optimization of the wastewater treatment plant Ginsheim-Gustavsburg in 2009 and 2010, a major improvement of the treatment performance and energy efficiency has been achieved. The average total nitrogen content in the effluent with 8.9 mg/l in 2009 had been reduced by 40 % by 2011. The energy consumption of 1,600 kWh/d (2009) had been decreased to 1,100 kWh/d (2011). The optimization steps in 2012 achieved a COD reduction in the effluent of 20 %.



Total nitrogen concentration of the effluent from January 2009 until May 2013

Summary

Average value		2009	07/2013 - 12/2013	Change
BOD _{Effluent}	mg/l	7.5	3.7	-51 %
COD _{Effluent}	mg/l	32.6	25.0	-23 %
P _{Effluent}	mg/l	1.1	0.6	-45 %
Nitrogen _{anorg Effluent}	mg/l	8.9	4.3	-25 %
Energy consumption _{Biology}	kWh	1,599	1,040	-35 %

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